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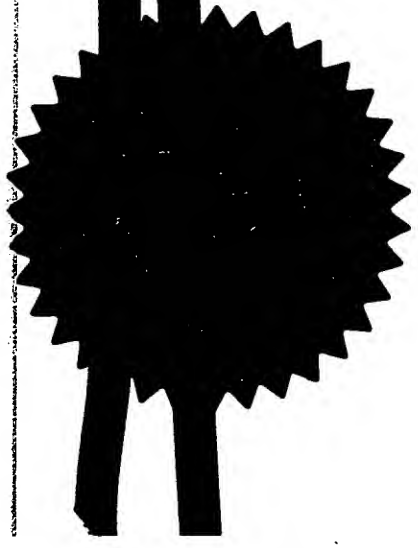

Signed

Dated 26 JAN 1999

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1. Your reference — 7844

2. Patent application number *(The Patent Office will fill in this part)* — 29 APR 1998 — **9808995.6**

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

NCR INTERNATIONAL, INC.
1700 SOUTH PATTERSON BOULEVARD
DAYTON, OHIO 45479
UNITED STATES OF AMERICA

Patents ADP number *(if you know it)* 6105449001

If the applicant is a corporate body, give the country/state of its incorporation — INCORPORATED IN THE STATE OF DELAWARE

4. Title of the invention — BANKING AND RETAIL TRANSACTION NETWORK

5. Name of your agent *(if you have one)* — VIVIEN IRISH

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

INTERNATIONAL IP DEPARTMENT
NCR LIMITED
206 MARYLEBONE ROAD
LONDON NW1 6LY

Patents ADP number *(if you know it)* 7186844001

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
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Continuation sheets of this form	
Description	11
Claim(s)	2
Abstract	1
Drawing(s)	2 + 2 (SS)

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11. I/We request the grant of a patent on the basis of this application.

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BANKING AND RETAIL TRANSACTION NETWORK

This invention relates to banking and retail transaction networks.

Banking and retail transaction networks comprise one or more transaction terminals connected to a server. Typical transaction terminals may comprise automated teller machines (ATMs), retail point-of-sale (PoS) terminals and general self-service terminals (SSTs). Each terminal has a central processor, typically PC based, which controls the application flow and user interface presentation. The application software and the graphics, animation and sound files used by the application are stored on a hard disk or other mass storage device within the terminal. The terminal is connected through either a high order communications link or a modem and telephone based link into a network which includes an information database (termed a legacy Host). Numbers of other terminals, which may be of the same or of a different kind, may be connected in the network. Simple client-server transactions are conducted between a terminal and the host in order to obtain specific customer information used in the processing of a customer's transaction. In the case of an ATM the transaction may typically be a cash withdrawal or a balance request. In the case of a retail PoS terminal a typical transaction is a price lookup.

A transaction terminal includes peripheral devices that are often very specific to the function of the terminal. Typical peripheral devices included in an ATM are a card reader, a cash dispenser, a receipt printer and an encrypting keyboard. These devices are not normally found on a PC and must be added both physically and electrically and be provided with appropriate control

software. The serial and parallel ports associated with the central processor of a PC can be used to supply control signals to the peripheral devices. Alternatively a proprietary communications system can be employed, for example the system known as Serial Distributed Control (SDC) is used in NCR ATMs. In either case the peripheral device requires some form of embedded processing capability to conduct communications with the central processor and to implement its commands upon the device.

The above approach has a number of failings. The main task of a central processor is to present information, graphics and animation to the user. However the processor is also required to conduct control and possibly maintenance operations on the peripheral devices connected to it. Therefore either a larger processor is required to obtain a given level of user interface performance or this performance is adversely affected by the control operations of the processor on the peripheral devices.

Additionally, the peripheral devices act as simple command processing systems, with all application control being conducted from the central processor. Peripheral processing capability is therefore not well utilised, acting as it does in a start-stop manner.

All applications software, peripheral device drivers and user interface files are held in the mass storage device in the terminal. This means that to upgrade the software it is necessary to install new files onto this mass storage device. Particularly in the case of ATMs where security is a significant factor this can be an arduous task requiring secure disc build operations at each individual terminal. While this may be feasible,

although cumbersome, for driver software in current use it is unlikely to be practical for transaction terminals in the future, which will be required to dynamically change their capabilities at run time and not just at the start of day. Examples of this include the need to operate with so-called "Smart" cards of various kinds. Smart cards have built-in electronic processing and data storage facilities. Card readers for such cards need to be able to both read from and write to different kinds of Smart cards and to the underlying applications contained within those cards. Smart card readers will be required to use different drivers dependant on the actual Smart card that is inserted. There may also be a requirement to download new applications software for transfer to an inserted Smart card. Printers will require the dynamic download of different graphics drivers to support various different graphics formats. Yet again dispensers may not be limited to dispensing cash only but may be required to dispense other media so that alternative or additional control software may be called for at run time.

It is an object of the invention to provide a transaction network in which the above problems are overcome.

According to the invention a banking or retail transaction network comprises a server and one or more terminals each containing a plurality of peripheral devices characterised in that the server is arranged to store applications and driver software for the peripheral devices and communication links are provided from the server to individual peripheral devices to enable such software to be downloaded directly from the server to the devices.

Preferably the peripheral devices include their own embedded processors to which the communication links are able to download software from the server.

In carrying out the invention the devices may each include hardware control means to control the hardware of the device and the processor embedded in a device operates the hardware control means in a manner determined by the software downloaded to the processor through the communications link.

In a preferred embodiment the communication links also enable the peripheral devices of a terminal to communicate with each other.

The peripheral devices may be selected from the following peripheral devices, namely: a user interface, a card reader, a receipt printer and a cash dispenser. The card reader is preferably capable of reading from and writing to Smart cards.

The communication links may be dedicated links. Alternatively they may comprise a modem and information signal transfer means for enabling transfer of signals from the modem through a telephone network to a server.

In embodiments of the invention there may be provided a banking or retail information database and a communications link between the banking or retail information database and the central server.

In order that the invention may be more fully understood reference will now be made to the accompanying drawings in which:

Fig. 1 is a block diagrammatic representation of one peripheral device and its place in a transaction network embodying the invention,

Fig. 2 is a block diagrammatic representation of a banking or retail transaction network embodying the invention and showing one terminal, and

Fig. 3 is a flow chart of card reader control software for detecting different types of card.

Referring now to Fig.1 there is shown therein a block diagram of a typical peripheral device 1 utilised in a network embodying the invention. Device 1 is connected over a Local Area Network (LAN) 2 to a central server 3. A legacy host 4 is also connected to server 3 via a Wide Area Network (WAN) 5. Device 1 contains an embedded processor 6 to which is connected a communications system 7. Communications system 7 together with LAN 2 form a communications link between device 1 and server 3. Also contained within device 1 there is hardware control electronics 8 for controlling the module hardware 9 of device 1. A number of different devices such as device 1 and each having different functions are grouped together in a transaction terminal

Processor 6 is able to communicate through communications system 7 and LAN 2 with server 3 and with any other devices connected to LAN 2. Processor 6 utilises communications system 7, LAN 2 and server 3 in order to load applications and drivers for hardware control electronics 8 as required. Embedded processor 6 applies the loaded driver to hardware control electronics 8 to control module hardware 9. Dependant upon the application loaded from server 3 to device 1, it is possible for the software to access legacy host 4 over LAN 2, server 3 and WAN 5 as required.

Referring now to Fig. 2 there is shown therein a block diagram of an ATM 11 having a plurality of peripheral devices each of which is an example of a typical peripheral device 1 described with reference to Fig. 1. In the example illustrated ATM 11 has various peripheral devices each of which fulfill a different function. Thus there are a user interface 12, a card reader 13, a receipt printer 14 and a cash dispenser 15. User interface 12 comprises a keyboard and a display unit. A typical ATM keyboard will have a numeric keypad and a small number of additional keys, which may be labelled "ENTER", "CANCEL" and so on.

A server 16 is positioned at a suitable location externally of ATM 11. ATM 11 is connected to server 16 by a communication link 17, which can be of any known type. For example link 17 may be part of a local area network (LAN), a wide area network (WAN) or else a dial up connection. Link 17 may be a high bandwidth network connection to allow for efficient and rapid download of software and may utilise the TCP/IP transfer protocol, although for single off-site terminals lower speed dial-up modems can be used. Other banking transaction terminals, in addition to ATM 11 may be linked to server 16 through other communication links similar to link 17.

A feature of communication link 17 is that each peripheral device or module in ATM 11 has independent access to server 16 through link 17 and is thus an individual client to server 16. Server 16 is connected to legacy Host 18 (which is banking or retail information database) through a further information signal communication link 19. Server 16 also contains the application software used by the modules in ATM 11. The

same applications software can also be used by corresponding modules in other terminals of the network which are linked to server 16.

The modules in ATM 11 access link 17 using standard networking protocols such as TCP/IP in order to connect both to server 16 and to the other modules. Each module may contain an embedded processor and appropriate hardware control electronics in order to be able to manipulate the hardware that constitutes the module. This can be done either by embedding the silicon description of the processor within module specific control chips or through the use of a generic embedded processor which uses general purpose input/output software to access module specific control chips as peripheral devices.

In addition to link 17 providing a direct connection from each module to server 16, link 17 also enables communication to take place among the individual modules of ATM 11 themselves. Thus information as to the operational state of any of the modules can be communicated to other modules.

In operation and with the applications software being held in server 16, the modules of ATM 11 require only a very simple boot code to be present in ROM or PROM or in Flash RAM in the modules themselves to allow them to boot up, initiate a network session with server 16 and download the current version of the applications software to each module. The downloading operation may use standard protocols such as BOOTP or TFTP. Software upgrades are easily achieved by upgrading the software held on server 16 and restarting the modules either directly at ATM 11 or via server 16. This allows for the remote administration of an entire transaction network.

The banking transaction network described above may be operated according to a number of application architectures. In one architecture a master/slave relationship exists between user interface 12 and each of the other peripheral devices. Application flow is conducted by the user interface module with the other peripheral modules being commanded to carry out specific tasks as required. Commands are issued over the communications links using standard network sockets, remote method invocation or remote procedure calls.

In an alternative architecture a peer to peer relationship exists between all of the modules of ATM 11. The occurrence of significant events is broadcast to ensure synchronisation of individual applications operating within each module.

The ability of peripheral modules within a transaction network to dynamically load required software components provides for an efficient and easily controllable mechanism for supporting the required functionality. For example for card reader 13 to be able to recognise different types of Smart card as well as magnetic stripe cards card reader 13 needs to be a multiple type card reader. To this end different software drivers must be available and accessible to support the different types of electrical interfaces, data streams and communications protocols for each type of card. In addition various mechanical and electrical considerations must be addressed.

The flow chart of Fig. 3 illustrates the basic application flow for recognising two types of Smart card with the processing of a magnetic stripe card as the default. It is the default program that is loaded

initially and waits for a card to be inserted. On detection that an attempt is being made to insert a card into card reader 13 the program provides for the opening of shutters and for the energising of drive motors as required and then identifies the type of card that has been inserted in accordance with the flow chart illustrated in Fig. 3. Whereas traditional card readers need to have all the necessary routines available all the time, either locally in ROM or else downloaded at the start of the day, it is necessary in a terminal embodying the invention to initially download only the default program and only when the presence of a Type 1 or Type 2 card (as indicated in the flow chart of Fig. 3) is detected is the relevant program for the detected card downloaded.

While the flow chart of Fig. 3 shows only two types of card it can readily be modified to detect any other number of cards. If it is desired to support another type of card the default program needs to be increased in size by only a small amount sufficient to support the extra decision block and type identification. On the other hand a traditional card reader would need to have its program increased by the total size of the routines required to process the extra type of card or application embedded in the card. Similar considerations apply to other modules such as printers and media dispensers.

In the case of printers, technologies such as the World Wide Web bring increasingly large amounts of graphic imagery to self service and point of sale terminals so that printers at such terminals require the ability to print out hard copy of such imagery. Printer 14 can load Web pages directly over communication link 17 from server 16 as well as loading the appropriate printer driver

software to support the graphics, fonts and other imagery in the downloaded Web pages. Such software can be resident in server 16 and be loaded to the printer only as and when required. As these drivers consist of code and data it is possible to load individual graphic imagery, along with its own printer driver software, in order to customise receipts, statements and the like either as part of a branding exercise or as a customisation exercise for a user. These graphic images are purely transitory and take up memory space in the printer module only for the duration of their task.

The traditional cash dispenser is likely to become more of a general multi-media dispenser, with the media to be dispensed ranging from paper in the form of currency notes, airline and other tickets and books of stamps and on to plastic media such as ski passes. Accordingly there is a requirement to support different media types at the dispenser which require different timing and control parameters for the different stacks of media material held by the dispenser. Appropriate software can be readily downloaded from server 16 through link 17 at run time without the need to store every alternative driver program at the dispenser.

Since each module has a direct connection through communication link 17 to server 16 it can communicate directly and independently with it not only to download software but also to obtain data specific to a current transaction while it takes place. For example a request may be made for information specific to the user and appropriate to conduct the current transaction. Thus dispenser 15 will require the users current balance in order to determine if the user had sufficient funds to cover a requested cash withdrawal. User interface 12 may

require account balance and bank statement information in order to present these to the user.

Since each peripheral device in ATM 11 is individually connected to server 16 the network is capable of downloading software from server 16 whenever it is required, for example on startup or on resetting. Furthermore the latest version of a particular software application can be instantly made available to all terminals in a network by loading it into server 16 without the need for physical access to any of the terminals. In addition terminal specific software can be made available at the server. Such terminal specific software may comprise marketing messages for display at a terminal.

By having a direct connection from the peripheral devices to the server it is possible to allow the peripheral software applications to take a more active role in the overall operational flow. This allows the user interface processor to concentrate on its primary task of providing user interface display graphics, animation and video facilities. The processing power required to operate individual peripheral devices can then be selected to optimise the cost/performance ratio.

It is desirable to monitor the operation of the modules and for this purpose various logs and hardware tallies can be provided for. The embedded processor at a module can be arranged to generate such logs and tallies and report the results. Access points can be provided over a network to allow for diagnostic operations including the downloading of monitoring information. The reports can be in HTML form thus allowing a standard Web browser to access the information.

CLAIMS:

1. A banking or retail transaction network comprising a server (3 or 16) and one or more terminals (11) each containing a plurality of peripheral devices (1 or 12,13,14,15) characterised in that the server (3 or 16) is arranged to store applications and driver software for the peripheral devices and communication links (2,7 or 17) are provided from the server (3 or 16) to individual peripheral devices (1 or 12,13,14,15) to enable such software to be downloaded directly from the server (3 or 16) to the devices.

2. The network as claimed in Claim 1 in which the peripheral devices (1) include their own embedded processors (6) to which the communication links (2,7 or 17) are able to download software from the server (3 or 16).

3. The network as claimed in claim 2 in which the devices (1) each include hardware control means (8) to control the hardware (9) of the device (1) and the processor (6) embedded in a device (1) operates the hardware control means (8) in a manner determined by the software downloaded to the processor (6) through the communications link (2,7).

4. The network as claimed in any one of the preceding claims characterised in that the communication links (2,7 or 17) also enable the peripheral devices (1 or 12,13,14,15) of a terminal (11) to communicate with each other.

5. The network as claimed in any one of the preceding claims characterised in that the peripheral devices are

selected from the following peripheral devices, namely: a user interface (12), a card reader (13), a receipt printer (14) and a cash dispenser (15).

6. The network as claimed in Claim 5 characterised in that the card reader (13) is capable of reading from and writing to Smart cards.

7. The network as claimed in Claim 5 or Claim 6 characterised in that the user interface (12) comprises a keyboard and a display unit.

8. The network as claimed in any one of the preceding claims in which the communication links (2,7 or 17) are dedicated links.

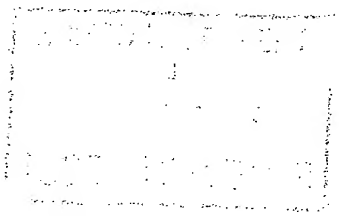
9. The network as claimed in any one of claims 1 to 7 characterised in that the communication links (2,7 or 17) comprise a modem and information signal transfer means for enabling transfer of signals from the modem through a telephone network to a server.

10. The network as claimed in any one of the preceding claims characterised in that there is provided a banking information database (4 or 18) and a communications link (5 or 19) between the banking information database (4 or 18) and the central server (3 or 16).

ABSTRACT

BANKING AND RETAIL TRANSACTION NETWORK

A banking or retail transaction network comprises a number of terminals, for example an ATM (11), Each terminal (11) comprises a plurality of peripheral devices such as a user interface (12), card reader (13), receipt printer (14) and cash dispenser (15). The applications software for the peripheral devices is held in a central server (16) located externally of the terminal (11) and linked to the terminal (11) through a communications link (17). The link (17) extends to the individual peripheral devices so that they are direct clients of the server (16). Additionally the individual peripheral devices are connected to each other over the link (17) to enable them to communicate directly with each other on a peer-to-peer basis. A banking information database (legacy Host) (18) is connected to the central server (16) through an information signal connection (19). (Fig. 2)



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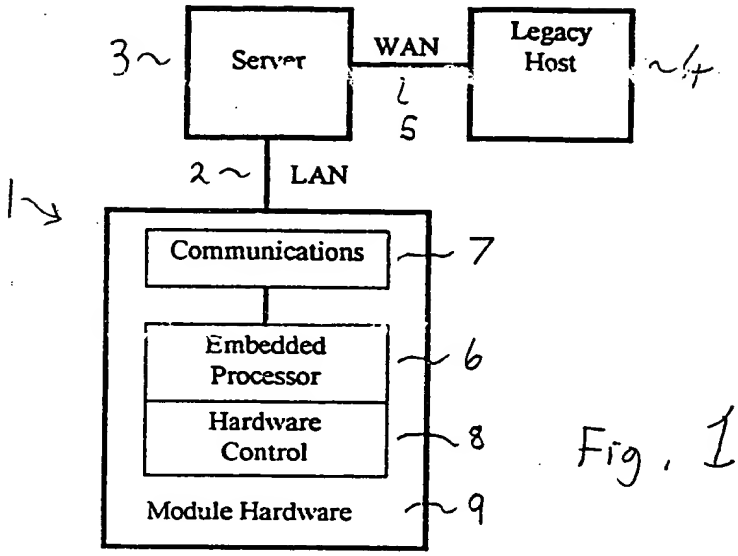

Fig. 1

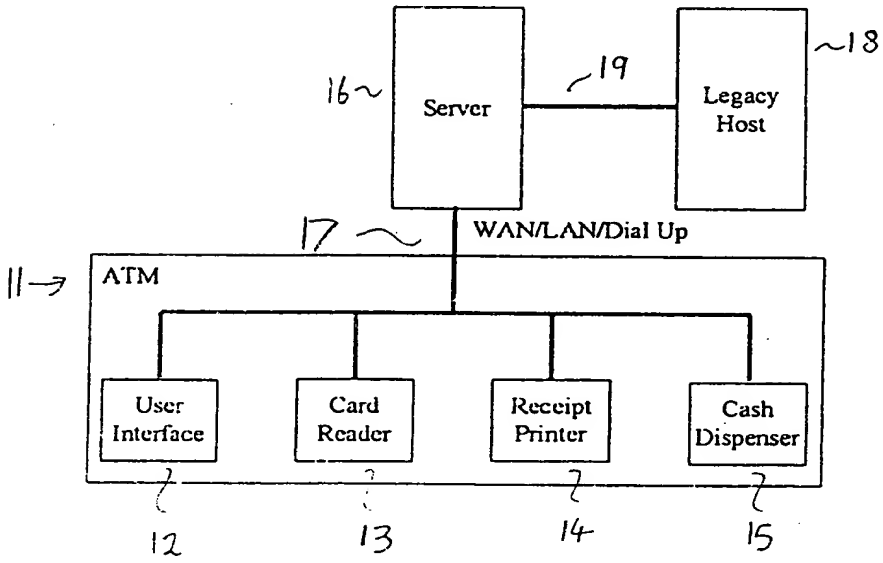

Fig. 2.

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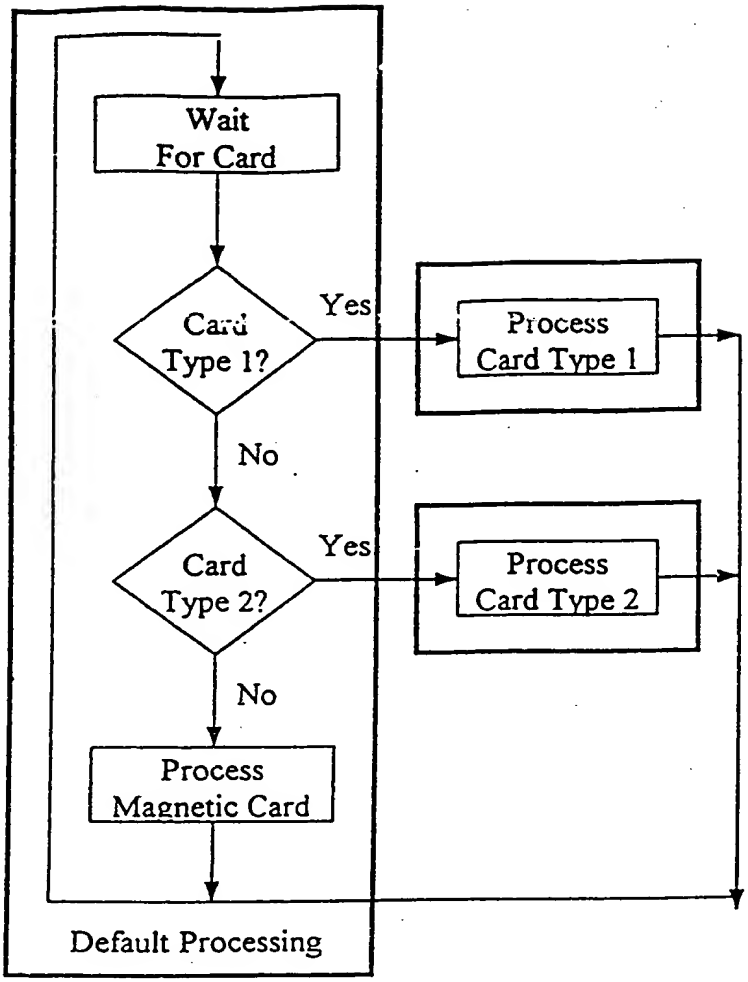
Wait
For Card
Card
Type 1?
Yes
Process
Card Type 1
No
Card
Type 2?
Yes
Process
Card Type 2
No
Process
Magnetic Card
Default Processing

FIG. 3